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Among the ionization methods of studying organic compounds, the surface ionization (SI) one occupies a special place because of its high sensitivity and selectivity to nitrogen bases. By now the general regularities of the SI of nitrogen-containing organic compounds have been revealed allowing prediction of ion composition and estimation of ion current densities [1] and the diverse SI devices have been developed: from simple diode sensors, detectors for gas chromatography to SI ion mobility and SI mass spectrometry [2]. It has been established that along with the nitrogen bases the terpens (C₅H₈)_n (n≥2) containing π-electrons of multiple bonds are ionized by the SI [3,4].

In this report the analytical possibilities of Surface-Ionization Mass Spectrometry (SI/MS) and Atmosphere Pressure Thermodesorption Surface-Ionization Spectroscopy (APTDSIS) [5] have been demonstrated for detection and analysis of some monoterpenoids – tetrahydro-cannabinol (THC), cannabidiol (CBD), cannabinol (CBN), natural hashish and their metabolites in the bio-samples of hashish-addicts. The SI of chromatographically pure cannabinoids, extracts of natural hashish and bio-samples of hashish-addicts have been studied by SI/MS.

The SI mass spectra of cannabinoids contain the lines of quasi-molecular ions [M-H]⁺₈ and [M-H-2nH]⁺₈ with elimination of up to 9 hydrogen atoms. Unlike the mass spectra obtained by electron ionization method, for all cannabinoids the base line in the SI mass spectra is the line of dissociative ion with $m/z=295$.

Also in this work, the extracts of hashish, washouts of hands, lips and blood of hashish-addicts have been studied by SI/MS. The SI mass spectrum consists of the same ion lines as those available in the SI mass spectra of THC, CBD, CBN and their metabolites.

The results of studying the thermodesorption surface-ionization spectra of chromatographically pure cannabinoids, natural hashish extracts and bio-samples with the device “Iskovich-1” [5] are presented. They have the characteristic maximums corresponding to sublimation temperature of cannabinoids molecules from the evaporator surface $T_{max} \sim 130^\circ\text{C}$, 140°C and 145°C for THC, CBD and CBN, respectively. The ionization efficiency increases in the same order from 2.5 to 10 K/mol within the linear range of the concentration dependence 2.0 – 3.0 orders of a magnitude. In the spectra of the bio-sample extracts along with the peaks of the basic components, the characteristic maximums corresponding to cannabinoid metabolites are observed. The developed APTDSIS method allows identification of a substance in the bio-samples according to characteristic sublimation temperature of molecules and determination of a substance amount according to calibration curves in the database.

The results of the analysis of cannabinoids, natural hashish extracts and their metabolites in the extracts of the bio-samples of hashish-addicts which was performed by the SI/MS and APTDSIS method have been compared with those obtained by the HP-6890/5973N with electron ionization.

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